

The omission of certain branches of the subject called for comment, because it is precisely these which, as a rule, are not adequately treated in English text-books. The ordinary text-books are out of date, and I cannot but think an excellent opportunity of supplementing their belated information has been missed. It would not prove a very easy task, however.

The map on Plate XVI. was criticised independently of the letterpress, because a map should speak for itself, and in some detail, because it represents that part of the world most familiar to us. I must confess that the more I study this map the less I like it. I do not know why the Guadalquivir fault is more "essential" than many other features of Spain, and the true form of the Meseta, which it helps to define, would have been better shown if the dislocation which forms the eastern boundary of the Meseta had been introduced. The "grain" of the land, shown by heavy blue lines like those used to express the Caledonian trend in Scotland, and not black like the Armorican in Brittany, is not correctly given even by those lines which are cut off by the fault; if they had been more precisely indicated and the Asturian curves added, a definite system, somewhat resembling a nest of parabolas, would have made itself manifest. The fundamental structure of the Meseta would then have been visible at a glance. Had only as much of these lines been introduced as is required to show their relation to the fault, the only objection that could have been raised would have been as to their incompleteness; as it stands, my comment that the map fails to express the true structure of Spain is a mild way of stating the facts. Passing to the Armorican peninsula, which, thanks to the observations of Barrois, is better known, we again find the trend lines out of drawing. It is difficult to know on what principle some have been omitted and others introduced; the omission does not make for clearness, and in this case, as in that of Spain, a truthful rendering would have simplified the facts by making them more intelligible. If the lines of Armorica had been properly generalised, we should have seen one of the most important of them (*axe de Cornouailles*) pointing straight at the Central Plateau, and the introduction of trend lines in the Central Plateau would have made clear the relation on which I insisted when pointing out that the connection of the trend lines of Brittany and the Central Plateau is no hypothesis, but a definitely known fact.

As it stands on the map, I still think the legend "Archæan Plateau of North-Western Europe" written across a tract showing strong Caledonian folding is confusing, and I cannot agree that anything in the subsequent history of this Central Plateau or of Spain calls for its distinction by colour from the rest of the Hercynian system; I am the more disposed to object to this colour scheme, since the same colour is used for Spain, the Central Plateau, and the so-called Archæan Plateau of the north, thus introducing a second source of confusion. It was not complained that the structure of Asia Minor is omitted from the map which bears the title "Europe," but that an important line common to Europe and Asia is wrongly drawn. The Cyprus-Taurus line is one of the most conspicuous on the map, and is rendered all the more so by the omission of other lines in Asia Minor. That part of it (in Transcaucasia) which is most erroneously drawn is not dotted in, but continuous; but even in Europe it does not run true, the relation of the Peloponnesus to Crete being inaccurately indicated. In the map of Asia greater care is exercised over this and related lines, but if Oswald's account of Armenia is correct there is still room for improvement. I am unaware of the existence of a mountain "knot" south of the Caucasus.

The objection to the diagram section shown in Fig. 83 is that the vertical scale is somewhere between 50 and 100 times the horizontal. Geologists have long agreed that such exaggerations are to be deprecated.

Assuming that the Eskimo are modified Mongolians, how does the action of the environment, as asserted by the author, account for the chief modification which distinguishes them, that is, the elongation of their heads? and to this I may add now the length of their face and the narrowness of their nose. The question involved

is the direct action of the environment, and in my opinion schoolboys should not be indoctrinated with notions of this kind. Again, admitting that the Australian aborigines are related to what the author calls "Caucasians," what reason is there for the assertion that they are "modified Caucasians"? This is to invert the order of facts. Numerous important anatomical characters stamp these people as a primitive race. The most plausible speculation would assign them a position near the root of the "Caucasian" stem, regarding them as an unprogressive survival of an ancestral stock rather than as one of the higher races "modified by adaptation to life in an arid region." But why introduce these jejune speculations at all?

The real gravamen of the criticism to which objection is taken lies in the remark that the author has not been sufficiently careful to distinguish between opinion and fact. The treatment of the whole question of the form of the earth is open to this charge. I do not understand the cryptic remark which the author interjects in his reference to this matter, but I may add that, in the opinion of competent mathematicians, there is no sound physics or dynamics at the back of the "tetrahedral" theory. It has proved wholly unfruitful, and has made no real scientific progress. That it has grown in popular favour is probably true, and its dogmatic presentation in a school text-book is calculated to advance it still further in this kind of progress; I cannot believe that this will be wholly to the satisfaction of the author, since I credit him with a juster appreciation of the responsibility which attaches to the instruction of youth.

THE REVIEWER.

The Gases of the Ring Nebula in Lyra.

EVERY friend of astronomical research has learned with great pleasure the news that Prof. Wolf, of Heidelberg, has succeeded in proving by spectrum photography that the well-known ring nebula in Lyra consists of four different gases, which, owing to the rapid rotation of the ring, have been separated and concentrated in four different layers. On using the image of the ring itself instead of the slit of a spectroscope, photographic images of the rings corresponding to the different spectral lines were obtained on the plates, but the dimensions of the rings were found to be different and to correspond to four gases of which the ring nebula is composed. The smallest ring, A, representing the innermost part of the ring, is composed of an unknown gas; the next largest ring, B, is composed of hydrogen; the next largest ring, C, consists of helium; and the largest ring, D, consists of an unknown gas. The question arises, What is the nature of the two unknown gases?

Bredig found in 1895 that if a mixture of two gases is subjected to centrifugal rotation, the relative concentration of the gas of higher molecular weight (i.e. higher density) increases with the radius of rotation. We must, therefore, assume that in the series of our four gases A, B, C, and D, the density or molecular weight increases from the smallest value of A to the largest value of D, and this is, indeed, proved by the fact, found by Wolf, that the gas B consists of hydrogen, molecular weight=2.016, and the gas C of helium, molecular weight=3.96. From this it follows that the gas concentrated in the smallest zone of the ring A must have a smaller molecular weight than hydrogen. This gas has not yet been isolated upon our earth, but its existence and atomic weight were predicted by the great Russian chemist and natural philosopher Mendeléeff in a popular article published in Russian in 1902, the essential part of which was translated into English in 1904 under the title "An Attempt towards a Chemical Conception of the Æther."

Mendeléeff shows that if the elements of the rare or inactive gases He, Ne, Ar, Kr, and Xe, discovered by Rayleigh, Ramsay, and Travers, are placed in the well-known nought-group, we must expect the existence of elements of the same group possessing smaller atomic weights than helium and hydrogen. Mendeléeff assumes that in the first horizontal series of the system, on the left side of, or before, hydrogen in the nought-group, where

we find hitherto an empty place, an element stands possessing an atomic and molecular weight of 0.4, and he adds that this element might be identical with Young's "coronium." This part of the periodic arrangement is:—

Series	Groups	
	O	I
1.	? = 0.4	H = 1.008
2.	He = 4.0	Li = 7.00

As there must be a definite ratio between the densities of the four gases A, B, C, and D and their radius of rotation corresponding to their maximal molecular concentration, it is not impossible that from the data obtained by Wolf the density of the lightest gas, i.e. its molecular weight, which must be identical with its atomic weight, might be calculated. As regards the heaviest unknown gas, D, if this is not a gas of the helium-argon group we may be allowed to point out that the existence of a gas possessing a larger atomic weight than hydrogen and a smaller atomic, but a larger molecular, weight than helium is not absolutely excluded.

BOHUSLAV BRAUNER.

Bohemian University, Prague, February 27.

On the α Rays from Radium B.

A RECENT number of the *Physikalische Zeitschrift* (x., 46, 1909) contains an article, by Frederic A. Harvey, in which he states that radium B gives out α particles, the ionisation range of which in air lies between 2.6 mm. and 3.0 mm. In investigating these short-range α particles he used a modification of the method employed by Bragg and Kleeman (*Phil. Mag.*, x., 318, 1905), but on account of the limited range of the radiation he did not use a cone of rays.

Some time ago the writer (*Phil. Mag.*, xi., 806, 1906) investigated the same subject by an entirely different method, and reached the conclusion that radium B did not give out α particles with sufficient velocity to ionise the air. I have recently repeated Harvey's experiment, but have been unable to get any indication whatever of the presence of short-range α particles. In addition to this, I have employed a third method, which eliminated most of the difficulties inherent in the previous one.

The principle of the method is very simple, and involves no change in the position of the testing vessel or wire during the experiment; it is based on the fact that the range of the α particles is increased by reducing the pressure of the air. The two plates of my testing vessel were placed 5 mm. apart; the lower one, which was of wire gauze, was 5 mm. above the active wire. Now, if none of the α particles present had a range in air at atmospheric pressure of less than 10 mm., then the ionisation current should vary as the pressure. If, however, radium B gives out α particles having a range of about 2.5 mm., and if they produce about the same number of ions per cm. of path as the α particles from radium C, then, after the pressure is reduced to half an atmosphere, the short-range α particles will begin to enter the testing vessel, and the ionisation will remain constant until the pressure has fallen to a quarter of an atmosphere. At this point the path of these α particles will extend through the entire depth of the testing vessel, and as the pressure is still further decreased the ionisation will again become proportional to the pressure.

The results of this experiment have shown that the ionisation in the testing vessel is approximately proportional to the pressure of the air from 76 cm. to 3 cm. It would, therefore, seem fair to conclude that there was not present on the active wire any substance giving out α particles which had a range in air from 1 mm. to 5 mm.

It should also be pointed out that Harvey's reason for attributing the short-range α particles to radium B is at fault. He assumes that after 140 minutes radium B has practically disappeared, and that only radium C remains. The theory of radio-active transformations, however, re-

quires that, after 140 minutes, the number of atoms of radium B and radium C changing per second shall be very nearly the same.

HOWARD L. BRONSON.

McGill University, Montreal, March 20.

British Association—Winnipeg Meeting.

It is becoming more and more noticeable at the meetings of the association that communications are read which are of special interest to members of sections other than that to which each of the papers happens to be presented. In fact, there is little doubt that interests are now far too much subdivided at our meetings, and that one of the main purposes of the association is therefore unfulfilled. Many of us have felt the desirability of associating sections for the consideration of topics of common interest—not merely for set debates.

I am glad to say that the arrangement is being made that at Winnipeg Sections A and B shall sit together on the Friday; Sections B, K, and the Subsection of Agriculture on the Monday; Sections B and I on the Tuesday. *Wheat* is to be the main subject of consideration on the Monday, and *food* on the Tuesday. It is hoped that it will be possible to treat these two important topics somewhat fully, so as to present, in abstract form, a clear statement of our present state of knowledge, and thereby guide public opinion as well as influence inquiry.

HENRY E. ARMSTRONG.

Fluorescence of *Lignum Nephriticum*.

MUSSCHENBROEK, referred to by Mr. Shaxby in *NATURE* of April 1 (p. 128), is evidently quoting from Boyle's memorable experiment, nearly a hundred years earlier. Mr. Shaxby will find it in the fifth volume of Boyle's works as follows:—

"If you make an infusion of *Lignum Nephriticum* in spring water it will appear of a deep colour like that of oranges when you place the vial between the window and your eye, and of a fine deep blue when you look on it with your eye placed between it and the window" ("Experimenta et Observationes Physicæ").

The history of the discovery is so fully dealt with in Tyndall's well-known lectures on light that it is surprising that anyone should imagine that Sir David Brewster was the first to observe fluorescence.

The *Lignum Nephriticum* is the Indian horse-radish tree, still cultivated for its fruit, which is eaten as a vegetable or pickled. The root has a flavour similar to that of horse-radish, and its title, *nephriticum*, is derived from the belief of the old pharmacologists that it was useful in cases of disease of the kidneys.

CHARLES E. BENHAM.

Essex County Standard Office, Colchester, April 3.

The Ancestry of the Marsupialia.

IN the notice (*NATURE*, December 24, 1908) of Prof. A. A. W. Hubrecht's paper on the early ontogeny of the Mammalia, the writer states that the view adopted by Prof. Hubrecht, according to which the Metatheria are the descendants of placental ancestors, is in direct opposition to my own. May I be permitted to correct this statement, and to point out that it is just this view which I have all along advocated, and still hold? As a matter of fact, the idea that the Metatheria and Eutheria may best be regarded as the divergent branches of an ancestral placental stock was first definitely expressed in a joint paper by Prof. J. T. Wilson and myself (*Quart. Journ. Microsc. Sc.*, vol. xxxix., p. 579).

JAS. P. HILL.

The Zoological Laboratory, University College,
W.C., March 24.

I TAKE Prof. Hubrecht to mean that the Didelphia (Metatheria) are descended from Eutheria, which is what Prof. Hill, in his own letter, refuses to admit.

THE WRITER OF THE NOTE.